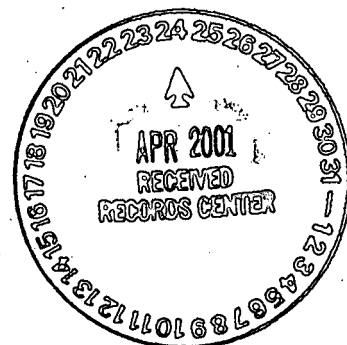


Strategy for

Land Configuration Design Basis Project

U.S. Department of Energy
Rocky Flats Closure Project
Rocky Flats Environmental Technology Site
Golden, Colorado

Prepared by Kaiser-Hill Company, LLC
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ATTACHMENT:

DATA QUALITY OBJECTIVES FOR THE LAND CONFIGURATION DESIGN BASIS PROJECT

1. Introduction

The Rocky Flats Environmental Technology Site (RFETS), located 16 miles northwest of Denver Colorado, encompasses approximately 6500 acres, is owned by the Department of Energy and is operated by the Kaiser-Hill Company, LLC. Before its current closure mission, RFETS was part of the nationwide nuclear weapons research, development and production complex. The Site is currently undergoing aggressive cleanup with a goal for Site closure by 2006. This cleanup is required and guided by the Rocky Flats Cleanup Agreement (RFCA) signed by USDOE, USEPA and Colorado Department of Public Health & Environment.

Because the topography of the Site has been altered by buildings and infrastructure such as roads, parking lots, storm water drainage control and waste water impoundments, the present topography may promote erosion and water runoff that will impact earlier remediation actions and natural drainage systems as these structures are removed. Unless controlled, these impacts may prevent compliance with surface water protection standards on site and at the Site boundary.

It is generally understood that surface soils over portions of RFETS were contaminated by accidental releases of radionuclides (actinides) including plutonium and americium. These actinides are strongly associated with soil particles and do not dissociate significantly in water. Further, it is generally understood by the regulators and stakeholders that the D&D and remedial actions planned for RFETS will not reduce contamination to background levels. To help assure that surface water quality standards are not exceeded, surface soils at closure must resist or be protected against long-term erosive forces that tend to mobilize trace quantities of residual contamination, if present.

To address this condition, RFETS will develop and implement an engineered final land surface configuration that will be protective of human health and will meet surface water protection standards consistent with future land use. The design of engineered drainages and erosion controls with specific infiltration and runoff requirements can be a powerful tool to reduce contaminant concentrations, limit the spread of residual contamination, and support natural resource decisions.

Initial assessments indicate that the engineered design will be required to minimize surface water runoff within the Site, to assess the need for water retention in the Walnut and Woman Creek drainages, and to maximize evapotranspiration. It is also anticipated that the configuration of the Woman Creek and Walnut Creek drainages at closure will determine DOE's ability to maintain long-term water quality compliance at the Site boundary. Surface water quality compliance, erosion, and habitat are anticipated to be the major drivers and determinants of the final drainage configuration.

In coordination with the Actinide Migration Evaluation (AME) and the Site Wide Water Balance Study (SWWB), the Land Configuration Design Basis Project (LCDB Project) is the planning activity that will guide the future design of the final Site land-surface configuration.

The LCDB Project will evaluate erosion and runoff controls, evapotranspiration measures, and hydrologic modifications to limit actinide transport via the erosion and sediment transport pathway. Combined with the other environmental restoration activities, this engineered land surface configuration will achieve the primary objectives and post-closure requirements of RFCA and be consistent with anticipated future land use.

2. Objectives of the LCDB Project

The objectives of the LCDB Project are:

- Develop the information (Design Basis) required for the design of the RFETS land surface, to meet human health, environment, and surface water protection standards at closure.
- Develop the land surface information required to support natural resources decisions for Site closure.
- Develop a conceptual design of the land configuration that supports the planning for remediation and Site closure
- Provide documentation to demonstrate that the conceptual design developed in the LCDB will meet the requirements for closure of RFETS stipulated in RFCA.

The RFETS Project Team, including DOE, developed detailed data quality objectives (DQOs) for the project using the seven-step process outlined in EPA guidelines (EPA 1994). A report summarizing the results of this DQO process is included as an Attachment to this Strategy.

3. Scope of the LCDB Project

The LCDB Project will address the final land configuration of the Industrial Area, the inner Buffer Zone, and the Woman and Walnut Creek drainages.

The conceptual design of configuration will allow for the evaluation of the adequacy of the current dams, potential environmental impacts and mitigation, potential implications for off-site community water management operations, post-closure stewardship obligations, and final DOE water management policy.

The LCDB Project will consider and incorporate Site activities which have or may affect the topography, the hydrology and, potentially, contaminant transport. These include activities such as D&D, remedial action, erosion mitigation measures, pond configuration, infiltration provisions, culvert removal, and road closure and other environmental restoration/closure activities.

4. Description of Work

The LCDB will take a "blank sheet" approach to the land configuration. That is, the project will first determine the information required to develop a final configuration, then with this information, the basis for a conceptual land configuration will be developed.

The conceptual land configuration developed in the LCDB Project will enable the evaluation of the adequacy of the current dams, enable the assessment of potential environmental impacts and mitigation options, identify potential implications for off site water management operations, quantify post-closure stewardship obligations, and assist the US DOE with water management policy decisions.

The work will develop the design basis for reconfiguring the Site's ponds, drainages, and land surfaces, if required, to achieve long term compliance with provisions of RFCA. The LCDB Project will consider site conditions including the historical operations, D&D activities, Environmental Restoration activities, and anticipated changes in Site operations prior to and at closure.

To meet Project objectives, the work has been organized into the following areas:

- Develop Work Plan
- Prepare Conceptual Design Report
- Develop Conceptual Design

During the LCDB Project execution, results from the AME and SWWB Studies will be incorporated into the design basis as they become available. Later, the individual land sector configurations from this project may be specifically evaluated by the AME or SWWB Studies to verify the effectiveness of the designs. Finally, prior to development of the final land configuration design, the Studies may be used to assess the effectiveness of the overall land configuration.

Develop Work Plan

The Work Plan details the work steps to achieve stated objectives and describes the scope, schedule, and deliverables associated with the work to be performed. The initial work involves information gathering and the development of design requirements and

assumptions needed to proceed with the project. Missing information and assumptions which have not been confirmed will be identified as data gaps.

The work will identify the appropriate physical, chemical and biological information required for design of the final surface configuration. This information will include Site water balance, geology, actinide migration, erosion dynamics, seismic parameters, vegetation requirements and sensitive species and habitat. For the Industrial Area (IA) and inner Buffer Zone (BZ), as well as the drainages, this will include all relevant meteorological, elevation, and current drainage morphology information. D&D end-states, remediation systems, post-remedial action topography/hydrology, monitoring systems, and documented residual contamination, are conditions which will be documented. The Work Plan will also document the geotechnical properties of local soils and local fill materials; it is known that hillside stability will be a design issue since the side slopes tend to slough.

Regarding contamination mobility, the available information is based on the current state of knowledge regarding behavior of contaminants of concern from ongoing AME Studies, potential residual contamination, and site water balance at closure. In most cases, this information is based on analytical data, on the best professional judgement, or on the preliminary results of various modeling efforts such groundwater contaminant transport and erosion models.

Assumptions

Some of the many assumptions which will be developed and documented in the Work Plan encompasses RFETS environmental restoration plans. Details and implications of the key assumptions will be developed in the Work Plan. Notable examples include:

- Surface structures including buildings, roads and parking lots are assumed to be removed from the IA
- Surface structures including buildings, and parking lots are assumed to be removed from the BZ
- Unpaved roads are assumed to be left in place unless erosion analyses indicates that removal is necessary
- East and west access roads as well as the North Perimeter Road are assumed to be left in place, or minimally redesigned.
- As a remedial action, the Present Landfill, the Solar Evaporation Pond, and the Original Landfill areas are assumed to be covered with evapotranspiration covers to minimize infiltration.
- As a remedial action, it is assumed that all process waste lines will be excavated and/or grouted in-place.
- D&D end-states call for removal of subsurface concrete structures to a depth of 3-ft below grade.

Design Requirements

The primary design requirement for the land configuration is the objective meeting of surface water quality standards. Additional requirements are related to this central goal and these will be identified and documented in the Work Plan. Those identified to date (below) address attributes such as resilience, longevity, long-term cost, appearance, access, and the format required of the final design:

- The final configuration is to be capable of withstanding severe storm events. The magnitude of the design storm event will be determined in the Project.
- The final configuration is to minimize long term stewardship costs, i.e., minimum maintenance and provisions for lowest life-cycle cost.
- The final configuration is to incorporate open-space land use values to the extent practicable. While the final configuration may not resemble the pre-RFETS condition, esthetic distractions such as water catch basins, culverts and barriers will be avoided wherever possible and designed to minimize the distraction where the feature is unavoidable.
- The final configuration is to provide continued access for monitoring RCRA units, groundwater monitoring wells, and remediation systems.
- Results of the LCDB Project are to be compatible in survey units and format with those utilized by the various RFETS designs, assessments and modeling efforts. This includes identification of geographical areas of concern, baseline concentrations, climatic data, erosion parameters, topography, vegetation, etc.

Data gaps will also be identified in this task. Data gaps include uncertainties, tentative plans, unsubstantiated constraints and assumptions which cannot be verified during the development of the Work Plan. Gaps will likely involve information that can be acquired during the time frame of the LCDB Project (e.g., soil borings), or information that will be acquired during future Site closure activities (e.g., residual soil contamination, actinide behavior).

If more than one design concept fulfills the design requirements and meets all the objectives of the LCDB Project, the Workplan will call for the development of alternate configurations and propose the criteria and methodology for their evaluation.

Prepare Conceptual Design Report

The Conceptual Design report will be used to :

- Document the design basis, functional design criteria and assumptions to be used as the basis of the design of the final land configuration
- Convey the conceptual design, including a description of its features
- Demonstrate that the conceptual design meets functional design requirements
- Document how the conceptual design basis and the conceptual design were developed
- Document the remaining data gaps

- Present information for project planning such as quantity estimates, estimated cost and implementation schedule.

The report may be used to support remedial action decisions regarding removal of subsurface structures; to support Site closure decisions regarding post-closure controls, water management and sensitive species and habitat protection; and to provide the RFCA parties and stakeholders with a reference point for discussing the final configuration design.

The LCDB Project will develop a consistent strategy to determine the requirement for reconfiguration in any given study area. This requirement will be based on contamination levels, erosion resistance, proximity to habitat, and other location-specific parameters. This same strategy may include development of specifications for the reconfiguration for individual areas of the site.

The Conceptual Design Report will be required to demonstrate how the Project considered the ecological implications and balanced them, to the extent possible, with water quality compliance requirements to minimize ecological disturbance. The LCDB Project will determine the degree of infringement and encroachment into sensitive habitat, if any. The severity of any impact will be used along with other balancing criteria to assess the relative suitability of configuration designs. The Conceptual Design presented in the LCDB Project report will provide a reference for discussing how the final configuration meets functional objectives including protection of ecological resources. Of special concern and receiving most attention are wetlands and the habitat of the threatened Preble's Meadow Jumping Mouse.

A requirement of the Conceptual Design Report will be an accounting of the affected wetland land area and mitigation ratios. Prior work at RFETS has established a Wetland Mitigation Bank and any destruction of existing wetland (e.g. due to the need to reconfigure the wetland) would require a replacement of equal or better quality, nearby or in the original location. The LCDB Project will develop wetland mitigation ratios for use in the accounting of this offset. This information may prove useful for decision making regarding natural resources policy for site closure.

Regarding design requirements for revegetation, the design specification will be consistent with generally accepted environmental restoration principles including the use of native plant species wherever possible, the blending of restoration vegetation into dominant local species and plant communities, and the avoidance of monocultures.

One important design requirement will be prevention or elimination of subsurface pathways that could convey residual contamination to the drainages. Data will be developed to indicate footing drains, outfalls and any subsurface utility or process line corridors that could act as conduits of residual contamination to the drainages.

The design will be required to evaluate Woman Creek and Walnut Creek drainages for their storm-event integrity (based on the event magnitude to be determined) and their ability to be converted to flow-through systems should that be considered beneficial in meeting project objectives.

In addition to the above examples, other design requirements will be identified during the course of the work and documented in the Conceptual Design Report.

The Conceptual Design Report will also include a schedule for implementation of the final land configuration design. The LCDB schedule will provide a path-to-closure and assist in the coordination of final land configuration with D&D, ER, monitoring, and characterization activities which may be concurrent.

Develop Conceptual Design

In parallel with the Conceptual Design Report, a Conceptual Design will be developed for the final land configuration of the IA and inner BZ, and the dams in Walnut Creek and Woman Creek, including the 903 Hillside and Mower Ditch.

It has been projected that DOE will be unable to assure long-term compliance with water quality standards at the Site boundary without engineered water retention/detention capability in the drainages. This will be determined on a site specific basis. Some dams in the drainages may be reconfigured to feature flow-through operation, i.e. the dam structure will be engineered to maintain a prescribed retention/detention capability as well as a release capability at prescribed flow volumes.

It is anticipated that the final topography of the remediated areas in the IA and inner BZ will be engineered to minimize surface water runoff to the drainages and minimize infiltration to groundwater. This means that the surface areas may be graded to facilitate water spreading and to maximize evapotranspiration. Storm water impoundments will be avoided if at all possible. Soil composition and re-vegetation schemes will support the evapotranspiration objective. The conceptual design will include information on changes to topography, and changes to surface water structures such as culverts, application of erosion controls, ponds, areas of topsoil and vegetative covers, road closures, areas etc.

The specification of topsoil for the restoration is to be included in the Conceptual Design. It is not realistic to expect revegetation to be successful unless import topsoil is used and site is nurtured for a period of time. Specifications for seed/hydro-mulching/topsoil are very site-specific and critical in the prairie environment.

A life cycle will be determined for the land configuration described in the Conceptual Design. The conceptual design will develop projections of the effective life of the erosion controls, drainages, soil covers, and vegetation covers which comprise the final land configuration.

Material quantity estimates, forthcoming from the conceptual design, will enable the planning of construction for the final land configuration. It is anticipated that the key materials are imported top soil, fill material, and rip-rap. Early procurement of these materials may be both cost effective and help to maintain overall Site closure schedules.

5. Project Interfaces

Several ongoing studies and data gathering efforts will contribute vital information to the design basis for the final surface configuration. While these projects address issues critical to compliance with remediation goals, they are not designed to specifically focus on the needs of the LCDB Project. Furthermore, all of the information required to design the final surface configuration will not be provided through these efforts. The approach of the LCDB Project will be to combine applicable portions of ongoing studies with additional required information to support construction of a final, compliant topography.

The results of the LCDB Project are integral to site decision-making for closure. The users of LCDB information are multidisciplinary and include assessment teams, environmental compliance groups, and functional capabilities such as groundwater modeling, Vadose zone modeling, the Actinide Migration Evaluation (AME), Water Management Closure Plan project, D&D planning, Environmental Restoration planning and risk assessment. These users also will require interaction and be kept informed of LCDB activities.

Subject matter experts and various team leaders at the Site will be called upon for meetings, reviews, and comments.

Special coordination will be necessary with the Actinide Migration Evaluation (AME) project. This ongoing project is focused on understanding actinide mobility in the environment and has completed studies to estimate the impacts of soil erosion and sediment transport on Site surface water quality, including the impact of storm events, remedial actions, hydrologic modifications, and land uses on surface water quality.

Special coordination will also be necessary with the Site Wide Water Balance Modeling Project. This project will develop a hydrologic model for the site, covering groundwater and surface water. The model will be calibrated and used to predict the response of the site to storm events and changes in operations. This information can then be interpreted to predict erosion, contaminant transport by sediments, and areas of seeps, wetlands, and habitat.

Regulatory Agencies

The Agencies are involved in all issues and decisions related to Site closure, and input from the Agencies will be solicited. Although the information forthcoming from the LCDB Project may be used in future decision documents, the project itself will not generate RFCA approveable documents.

US Department of Energy

DOE involvement is important in the project especially in those areas affecting natural resources decisions, land use, and water policy. DOE will be solicited to provide planning information on these key issues during the project-scoping phase. DOE participation will be required in the formal DQO sessions. Periodic technical presentations will be scheduled and DOE will be asked to attend. Work Plans, Conceptual Designs, and Conceptual Design Reports generated will be provided to DOE for information and review.

Stakeholders

Stakeholder and public involvement is both solicited and encouraged. Specific information meetings are planned for presenting the Strategy, Work Plan and Conceptual Design which will contain the design basis for the land configuration. Presentation materials and visual-aids will be designed specifically to facilitate understanding of the complex issues by non-technical individuals. Feedback from the stakeholders will be considered when finalizing the land configuration design for the site.

6. Project Schedule

The LCDB Project was scoped internally and this process commenced in October 2000. The subcontractor Statement of Work was prepared based on interviews of DOE and K-H technical personnel, preliminary Data Quality Objectives (DQOs), and this strategy document. After thorough review of the subcontractor's proposal, the proposal was finalized and the award made.

Project milestones include:

- Subcontractor's Proposal / Statement of Qualifications - November 2000
- Finalization of Data Quality Objectives – January 2001
- Work Plan, Draft – April 2001
- Work Plan, Final – June 2001
- Conceptual Design and Conceptual Design Report, Draft – November 2001
- Conceptual Design and Conceptual Design Report, Final – January 2002

7. References

EPA, *Guidance for the Data Quality Objective Process*, QA/G-4 EPA/600/R-96/055, September 1994

Kaiser Hill, *Report on Soil Erosion and Surface Water Sediment Transport Modeling for the Actinide Migration Evaluation at the Rocky Flats Environmental Site*, August 2000

Kaiser Hill, *Final Integrated Water Management Plan for RFETS*, RF/RMRS-97-078.UN, February 1998

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RMRS, *1998 Annual Rocky Flats Cleanup Agreement (RFCA) Groundwater Monitoring Report for the Rocky Flats Environmental Technology Site*, November 30, 1999

RMRS and Kaiser-Hill, *Industrial Area Characterization and Remediation Strategy, Rocky Flats Technology Site*, September 1999

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US DOE, *Natural Resources Management Policy, RFETS, Rev. 0*, Sept 30, 1998

US DOE, *Final Rocky Flats Cleanup Agreement (RFCA)*, July 19, 1996: Preamble; Attachment 5; Appendix 3-Chapter 3; and Appendix 9.

Wright Water Engineers, *Drainage and Flood Control Master Plan, Woman Creek, Walnut Creek, Upper Dry Creek and Rock Creek*, April 1992

Wright Water Engineers, *Source Control Alternatives Analysis, Phase 2 Progress Report*, September 1999

Attachment:

Data Quality Objectives

for the

Land Configuration Design Basis Project